

CLAIMS

1. A rubber composition **based on** at least a diene elastomer, a reinforcing filler, a plasticizing system and a cross-linking system, characterized in that said plasticizing system comprises (phr = parts by weight per hundred parts of elastomer):
 - between 5 and 35 phr of an MES or TDAE oil;
 - between 5 and 35 phr of a polylimonene resin.
2. A composition according to Claim 1, the amount of polylimonene resin being between 5 and 25 phr.
3. A composition according to Claim 2, the amount of polylimonene resin being between 5 and 20 phr.
4. A composition according to any one of Claims 1 to 3, the glass transition temperature (Tg) of the polylimonene resin being greater than 40°C.
5. A composition according to Claim 4, Tg being greater than 50°C.
6. A composition according to any one of Claims 1 to 5, the number-average molecular weight (Mn) of the polylimonene resin being between 400 and 2000 g/mol.
7. A composition according to Claim 6, Mn being between 500 and 1000 g/mol.
8. A composition according to any one of Claims 1 to 7, the amount of MES or TDAE oil being between 10 and 30 phr.
9. A composition according to Claim 8, the amount of MES or TDAE oil being between 10 and 25 phr.
10. A composition according to any one of Claims 1 to 9, the amount of total plasticizing system being between 15 and 45 phr.
11. A composition according to Claim 10, the amount of total plasticizing system being between 20 and 40 phr.
12. A composition according to any one of Claims 1 to 9, the plasticizing system furthermore comprising an unsaturated (C₁₂-C₂₂) fatty acid triester of glycerol.

13. A composition according to Claim 12, the triester being a glycerol trioleate.
14. A composition according to Claim 13, the glycerol trioleate being present in the form of a vegetable sunflower oil or rapeseed oil.
- 5 15. A composition according to any one of Claims 12 to 14, the amount of triester being between 5 and 35 phr.
- 10 16. A composition according to any one of Claims 12 to 15, the amount of total plasticizing system being between 20 and 70 phr.
17. A composition according to Claim 16, the amount of total plasticizing system being between 30 and 60 phr.
- 15 18. A composition according to any one of Claims 1 to 17, the diene elastomer being selected from among the group consisting of polybutadienes, natural rubber, synthetic polyisoprenes, butadiene copolymers, isoprene copolymers and mixtures of these elastomers.
- 20 19. A composition according to any one of Claims 1 to 18, the amount of reinforcing filler being between 20 and 200 phr.
20. A composition according to Claim 19, the amount of reinforcing filler being between 30 phr and 150 phr.
- 25 21. A composition according to Claims 19 or 20, the reinforcing filler comprising majoritarily an inorganic filler.
22. A composition according to Claim 21, the inorganic reinforcing filler being silica.
- 30 23. A composition according to Claims 19 or 20, the reinforcing filler comprising majoritarily an organic filler.
24. A composition according to Claim 23, the reinforcing organic filler being carbon black.
- 35 25. A process for preparing a rubber composition having an improved resistance to abrasion and to cuts, this composition being based on a diene elastomer, a reinforcing filler, a plasticizing system and a cross-linking system, said process comprising the following steps:
- incorporating in a diene elastomer, during a first step referred to as "non-productive", at least a reinforcing filler and a plasticizing system, by thermomechanically kneading the

entire mixture, in one or more stages, until a maximum temperature of between 110°C and 190°C is reached;

- cooling the entire mixture to a temperature of less than 100°C;
- then incorporating, during a second step referred to as "productive", the cross-linking system;
- kneading the entire mixture until a maximum temperature of less than 110°C is reached,

and being characterized in that said plasticizing system comprises:

- between 5 and 35 phr of an MES or TDAE oil;
- between 5 and 35 phr of a polylimonene resin.

26. A process according to Claim 25, the amount of polylimonene resin being between 5 and 25 phr.

27. A process according to Claim 26, the amount of polylimonene resin being between 5 and 20 phr.

28. A process according to any one of Claims 25 to 27, the glass transition temperature (T_g) of the polylimonene resin being greater than 40°C.

29. A process according to any one of Claims 25 to 28, the number-average molecular weight (M_n) of the polylimonene resin being between 400 and 2000 g/mol.

30. A process according to any one of Claims 25 to 29, the amount of MES or TDAE oil being between 10 and 30 phr.

31. A process according to any one of Claims 25 to 30, the amount of total plasticizing system being between 15 and 45 phr.

32. A process according to any one of Claims 25 to 31, the plasticizing system furthermore comprising an unsaturated (C₁₂-C₂₂) fatty acid triester of glycerol.

33. A process according to Claim 32, the triester being a glycerol trioleate.

34. A process according to Claim 33, the glycerol trioleate being present in the form of a vegetable sunflower oil or rapeseed oil.

35. A process according to any one of Claims 32 to 34, the amount of triester being between 5 and 35 phr.
36. A process according to any one of Claims 32 to 35, the amount of total plasticizing system being between 20 and 70 phr.
37. A process according to any one of Claims 25 to 36, the diene elastomer being selected from among the group consisting of polybutadienes, natural rubber, synthetic polyisoprenes, butadiene copolymers, isoprene copolymers and mixtures of these elastomers.
38. A process according to any one of Claims 25 to 37, the amount of reinforcing filler being between 20 and 200 phr.
39. The use of a composition according to any one of Claims 1 to 24 for the manufacture of a finished article or a semi-finished product intended for a suspension system of a motor vehicle.
40. The use according to Claim 39, the finished article being a tire.
41. The use according to Claim 39, the semi-finished product being a tire tread.
42. The use of a composition according to any one of Claims 12 to 17, for the manufacture of a tread for a winter tire.
43. A finished article intended for a suspension system of a motor vehicle, comprising a composition according to any one of Claims 1 to 24.
44. A finished article according to Claim 43, consisting of a tire.
45. A winter tire comprising a rubber composition according to any one of Claims 12 to 17.
46. A semi-finished product intended for a suspension system of a motor vehicle, comprising a composition according to any one of Claims 1 to 24.
47. A semi-finished product according to Claim 46, consisting of a tire tread.
48. A tread for a winter tire comprising a rubber composition according to any one of Claims 12 to 17.

NB JR :

Tom, I would prefer finally - now or later if not possible at this stage - amending Claim 48 in order to cover, rather than a tread, "A winter tire having a tread comprising a rubber composition ..." and dividing expressly claim 48 in six different claims (due to its initial dependency to claims 12-17). In such case, claim 45 above should be cancelled.

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49. A plasticizing system usable for the plasticizing of a diene rubber composition, characterized in that it comprises an MES or TDAE oil and a polylimonene resin.

10 **50.** A plasticizing system according to Claim 49, characterized in that it furthermore comprises an unsaturated (C₁₂-C₂₂) fatty acid triester of glycerol.

51. A plasticizing system according to Claim 50, the triester being a glycerol trioleate.

15 **52.** A plasticizing system according to Claim 51, the glycerol trioleate being present in the form of a vegetable sunflower oil or rapeseed oil.

53. The use of a plasticizing system according to any one of Claims 49 to 52, for the plasticizing of a diene rubber composition.

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